

Federal Aviation Administration – [Regulations and Policies](#)  
Aviation Rulemaking Advisory Committee

Rotorcraft Issue Area

Performance and Handling Qualities Requirement Working Group

**Task 1 – Performance and Handling Qualities Requirements**

## **Task Assignment**

[Federal Register: January 20, 1995 (Volume 60, Number 13)]  
[Notices]  
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DEPARTMENT OF TRANSPORTATION

Aviation Rulemaking Advisory Committee; Performance and Handling  
Qualities Requirements Working Group

AGENCY: Federal Aviation Administration (**FAA**), DOT.

ACTION: Notice of establishment of the Performance and Handling  
Qualities Requirements Working Group.

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SUMMARY: Notice is given of the establishment of the Performance and  
Handling Qualities Requirements Working Group and new tasks assigned to  
the Aviation Rulemaking Advisory Committee (ARAC). This notice informs  
the public of the activities of the ARAC.

FOR FURTHER INFORMATION CONTACT:

Mr. Mark Schilling, Manager, Rotorcraft Standards Staff, 2601 Meacham  
Boulevard, Fort Worth Texas, telephone number (817) 222-5110.

SUPPLEMENTARY INFORMATION: The Federal Aviation Administration (**FAA**)  
has established an Aviation Rulemaking Advisory Committee (ARAC) (56 FR  
2190, January 22, 1991; and 58 FR 9230, February 19, 1993). One area  
the ARAC deals with is rotorcraft issues. These issues involve the  
airworthiness standards for normal and transport category rotorcraft in  
parts 27 and 29 of the Federal Aviation Regulations, which are the  
responsibility of the Director, Aircraft Certification Service, **FAA**.

Task

The Performance and Handling Qualities Requirements Working Group  
is charged with recommending to ARAC new or revised standards for  
flight test procedures and requirements. The products of this exercise  
are intended to be harmonized standards, acceptable to both the **FAA** and  
the Joint Aviation Authorities.

Specifically, the task is as follows:

Review Title 14 Code of Federal Regulations part 27 and Appendix B  
and part 29 and Appendix B, and supporting policy and guidance material  
for the purpose of determining the course of action to be taken for  
rulemaking and/or policy relative to the issue of harmonizing  
performance and handling qualities requirements.

ARAC recommendations to the **FAA** should be accompanied by  
appropriate documents. Recommendations for rulemaking should be  
accompanied by a complete draft of the notice(s) of proposed  
rulemaking, including the benefit/cost analysis and other required  
analyses. Recommendations for the issuance of guidance material should

be accompanied by a complete advisory circular.

ARAC has formed the Performance and Handling Qualities Requirements Working Group to analyze and recommend to it solutions to issues contained in the assigned tasks. If ARAC accepts the working group's recommendations, it forwards them to the **FAA**.

ARAC working groups are comprised of technical experts on the subject matter. A working group member need not necessarily be a representative of one of the member organizations of ARAC. An individual who has expertise in the subject matter and wishes to become a member of the working group should write the person listed under the caption FOR FURTHER INFORMATION CONTACT expressing the desire, describing his or her interest in the task, and the expertise he or she would bring to the working group. The request will be reviewed by the assistant chair and working group leader, and the individual will be advised whether or not the request can be accommodated.

#### Working Group Reports

Each working group formed to consider ARAC tasks is expected to comply with the procedures adopted by ARAC and given to the working group chair. As part of the procedures, the working group is expected to:

A. Recommend time line(s) for completion of the task, including rationale, for consideration at the meeting of the ARAC to consider rotorcraft issues held following publication of this notice.

B. Give a detailed conceptual presentation on the task to the ARAC before proceeding with the work stated under item C below. [[Page 4221]]

C. Give a status report on the task at each meeting of ARAC held to consider rotorcraft issues.

The Secretary of Transportation has determined that the formation and use of the ARAC are necessary in the public interest in connection with the performance of duties imposed on the **FAA** by law. Meetings of ARAC will be open to the public except as authorized by section 10(d) of the Federal Advisory Committee Act. Meeting of the Performance and Handling Qualities Requirements Working Group will not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on January 13, 1995.  
Chris A. Christie,  
Executive Director, Aviation Rulemaking Advisory Committee.  
[FR Doc. 95-1536 Filed 1-19-95; 8:45 am]  
BILLING CODE 4910-13-M

## **Recommendation**

[4910-13]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part Parts 27 and 29**

[Docket No. FAA-2000- ; Notice No. ]

**RIN 2120-** .

**Performance and Handling Qualities Requirements for Rotorcraft**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** This notice proposes changes to the airworthiness standards for normal and transport category rotorcraft. The changes would enhance the safety standards for performance and handling qualities to reflect the evolution of rotorcraft capabilities.

**DATES:** Send your comments on or before [*Insert date 90 days after date of publication in the **Federal Register**.*]

**ADDRESSES:** Address your comments to the Docket Management System, U.S.

Department of Transportation, Room Plaza 401, 400 Seventh Street, SW., Washington, DC 20590-0001. You must identify the docket number FAA-2000-XXXXX at the beginning of your comments, and you should submit two copies of your comments. If you wish to receive confirmation that the FAA received your mailed comments, include a self-addressed, stamped postcard.

You may also submit comments through the Internet to <http://dms.dot.gov>. You may review the public docket containing comments to these proposed regulations in person in the Dockets Office between 9:00 a.m. and 5:00 p.m., Monday through Friday,

except Federal holidays. The Dockets Office is on the plaza level of the NASSIF Building at the Department of Transportation at the above address. Also, you may review public dockets on the Internet at <http://dms.dot.gov>.

**FOR FURTHER INFORMATION CONTACT:** Lance T. Gant, Rotorcraft Standards Staff, Rotorcraft Directorate, ASW-110, Federal Aviation Administration, Fort Worth, Texas 76193-0110, telephone number (817) 222-5114; facsimile (817) 222-5961, e-mail [lance.t.gant@faa.gov](mailto:lance.t.gant@faa.gov).

**SUPPLEMENTARY INFORMATION:**

**Comments Invited**

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. We also invite comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. The docket is available for public inspection before and after the comment closing date. If you wish to review the docket in person, go to the address in the ADDRESSES section of this preamble between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. You may also review the docket using the Internet at the web address in the ADDRESSES section.

Before acting on this proposal, we will consider all comments we receive on or before the closing date for comments. We will consider comments filed late if it is possible to do so without incurring additional expense or delay. We may change this proposal in light of the comments we receive.

If you want the FAA to acknowledge receipt of your mailed comments on this proposal, include with your comments a pre-addressed, stamped postcard on which the docket number appears. We will stamp the date on the postcard and mail it to you.

### **Availability of Rulemaking Documents**

You may obtain an electronic copy of this document using the Internet by taking the following steps:

- (1) Go to the search function of the DOT's electronic Docket Management System (DMS) web page (<http://dms.dot.gov/search>).
- (2) On the search page type in the last four digits of the Docket number shown at the beginning of this notice. Click on "search."
- (3) On the next page, which contains the Docket summary information for the Docket you selected, click on the document number of the item you wish to view.

You may also obtain an electronic copy of this document using the Internet through the Office of Rulemaking's web page at <http://www.faa.gov/avr/armhome.htm> or the Federal Register's web page at [http://www.access.gpo.gov/su\\_docs/aces/aces140.html](http://www.access.gpo.gov/su_docs/aces/aces140.html).

You may also obtain a copy of this document by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence



Avenue SW, Washington, DC 20591, or by calling (202) 267-9680. Make sure to identify the docket number and notice number of this proposal.

## **Background**

### **Statement of the Problem**

Due to technological advances in design and operational trends in normal and transport rotorcraft performance and handling qualities, the FAA is proposing new or revised airworthiness standards. Some of the current regulations are outdated and do not reflect, in some cases, actual certification practices, safety levels attained by modern rotorcraft, and FAA-approved equivalent level of safety findings.

### **History**

It has been approximately 17 years since the last major promulgation of rules that address the performance and handling qualities of rotorcraft (Amendments 29-24 and 27-21, 49 FR 44433 and 49 FR 44436, November 6, 1984). Since that time, the FAA has developed formal policy and procedures that address certain aspects of these requirements to make the rules workable within the framework of later rotorcraft designs and operational needs. In addition, most manufacturers have routinely exceeded some of the minimum performance requirements in the Federal Aviation Regulation (FAR) in order to meet customer needs. Conversely, in some cases, the FAA did not foresee some of the situations that have required additional policy, guidance, or standardization when these rules were promulgated. After the publication of the first issue of the Joint Aviation Regulations (JAR) for FAR parts 27 and 29, which closely mirrored FAR part 29 at amendment 31 and FAR part 27 at amendment 27, the European Joint Aviation Authorities (JAA) Helicopter Airworthiness Study Group (HASG) agreed to form a

specialist sub-group to review proposals on flight matters that were not incorporated when the JAR was promulgated. This sub-group consisted of representatives of the HASG, Association of European des Constructeurs de Material Aerospatale (AECMA), Aerospace Industries Association of America (AIA), FAA, United Kingdom Civil Aviation Authority (CAA), and the French Centre d'Essais Vol (CEV). The group first met in January 1994 and presented their findings to the HASG in May 1994. By notice in the **Federal Register** (60 FR 4220, January 20, 1995), the FAA announced the establishment of the Performance and Handling Qualities Requirements Harmonization Working Group (PHQHWG) which was formed to continue the work completed by the specialist sub-group and presented to the HASG. The PHQHWG was charged with recommending to ARAC new or revised standards for flight-test procedures and requirements. The PHQHWG was tasked to "Review Title 14 Code of Federal Regulations Part 27 and Appendix B, and Part 29 and Appendix B, and supporting policy and guidance material for the purpose of determining the course of action to be taken for rulemaking and/or policy relative to the issue of harmonizing performance and handling qualities requirements."

The PHQHWG includes representatives that expressed an interest through submittal of comments to the FAA or through the public meeting process. The PHQHWG includes representatives from the AIA, the AECMA, the European JAA, Transport Canada, and the FAA Rotorcraft Directorate. Additionally, the PHQHWG consulted representatives from the small rotorcraft manufacturers. This broad participation is consistent with FAA policy to involve all known interested parties as

early as practicable in the rulemaking process. The PHQHWG first met in March 1995 and has subsequently met for a total of nine meetings.

### **General Discussion of the Proposals**

Utilizing the report submitted to the HASG as a starting point, the PHQHWG agreed that there was a need to update the rotorcraft performance and handling qualities standards. As the meetings progressed, the group evaluated additional internally-generated proposals that were deemed to be pertinent to the group task. These proposals were either accepted or rejected on their merits and by consensus of the group. The group also came to a common understanding of acceptable methods of compliance for the proposals as well as the current requirements, and appropriate Advisory Circular material was developed concurrently.

There was considerable discussion in the working group with regard to the evolution of the Appendix B Instrument Flight Rules (IFR) flight characteristic requirements. Early IFR helicopters were developed using relatively simple analog systems consisting primarily of two or three-axis rate damping with, in some cases, attitude or heading hold features. Today, there are complex digital automatic flight control systems or flight management systems available with highly redundant system architectures. These highly complex systems may have enough redundancy or compensating features such that system operating characteristics as well as acceptable aircraft handling qualities can be maintained in degraded modes of operation. Due to the difficulty of adequately addressing all the various elements of these complex systems and the associated flight characteristics, it was decided to not initiate FAR parts 27 and 29 rulemaking addressing these complex systems at this time, and that the certification

requirements for these types of complex systems would be handled on a case-by-case basis.

## **Section-by-Section Discussion of the Proposals**

### **Section 27.25 Weight limits**

Some recent certifications have required placing weight, altitude, and temperature limitations in the Rotorcraft Flight Manual (RFM) to achieve an equivalent level of safety with certain flight requirements. Specifically, the requirement for controllability near the ground while at maximum weight and 7,000 feet density altitude and the requirement to establish the height-speed envelope at maximum weight or the highest weight allowing for hover out-of-ground-effect (OGE) for altitudes above sea level are considered a minimum level of safety for normal category rotorcraft. If literal compliance with these minimum standards is realized, the resultant data is presented as performance information in the flight manual. In some cases, an equivalent level of safety has been shown by including limitations in the RFM that show the actual capability of the rotorcraft. The intent of this change is to formalize these equivalent level of safety findings by requiring weight limitations be placed in the RFM if the requirements in §§ 27.79 or 27.143(c)(1) cannot be met.

### **Section 29.25 Weight limits**

Amendments 29-21 (48 FR 4374, January 31, 1983) and 29-24 (49 FR 44422, November 6, 1984) granted relief to certain operating limitations for Category B certificated rotorcraft with a passenger seating capacity of nine or less. These amendments stated that, for these rotorcraft, the hover controllability requirements of §

29.143(c) need not be operating limitations. However, these amendments did not specifically include language that would assure appropriate limitations are provided in the RFM. The FAA has determined that it is necessary to establish appropriate limitations to ensure safe aircraft operations within the demonstrated performance envelope. This proposal would amend this paragraph to explicitly require that the maximum weights, altitudes, and temperatures in which the requirements of § 29.143(c) can be met, which may include limited wind azimuths, must be provided as limitations in the RFM.

**New § 27.49 Performance at minimum operating speed (former § 27.73)**

This proposal would redesignate § 27.73 as § 27.49 and add a requirement to determine the OGE hover performance. Installed engine power available on normal category helicopters has increased significantly since the promulgation of the original requirement, particularly for hot-day and high-altitude conditions. As a result, OGE operations once limited to special missions have become common. Most manufacturers present OGE hover performance data in approved flight manuals, although these data are not currently required. This change would mandate the current industry practice and require that OGE hover data be determined throughout the range of weights, altitudes, and temperatures.

**Section 27.51 Takeoff**

The proposal would revise the wording of § 27.51 to recognize that the most critical center-of-gravity (CG) may not be the extreme forward CG, and would require that tests be performed at the most critical CG configuration and at the maximum weight for which takeoff certification is requested. The current standard requires that tests be

performed at the extreme forward CG and at a weight selected by the applicant for altitudes above sea level. Although for most rotorcraft the extreme forward CG is most critical, this may not be true for all rotorcraft, and the amended language would provide for such possibilities. This change more clearly states the intent of the rule, which is to demonstrate engine failure along the takeoff flight path at the weight for which takeoff data are provided. The intent of the regulation is unchanged in that a takeoff may not require exceptional skill or favorable conditions throughout the range of approved takeoff altitudes. The requirement to demonstrate safe landings after an engine failure at any point along the takeoff path up to the maximum takeoff altitude or 7,000 feet, whichever is less, has been clarified to explicitly state that the altitudes cited in the requirement are density altitudes.

#### **Section 27.75 Landing**

The proposal would revise § 27.75(a) to state the required flight condition in more traditional rotorcraft terminology. Included in this change is the requirement for multi-engine helicopters to demonstrate landings with one engine inoperative and initiated from a steady-state approach. The proposal would also make a minor revision in the text by replacing the word “glide” with “autorotation”.

#### **Section 27.79 Limiting height-speed envelope**

The proposal revises § 27.79(a)(1) to include the words "density altitude" after "7000 feet". The proposal would revise § 27.79(a)(2) by removing the word “lesser” from the first sentence. This change reflects that current OGE weights for helicopters are not necessarily less than the maximum weight at sea level. Additionally, in § 27.79(b)(2), the term “greatest power” is removed and replaced with language that more

clearly states the power to be used on the remaining engine(s) for multi-engine helicopters. This engine power is the minimum uninstalled specification engine power after it is corrected for installation losses. The specific text in the proposed rule of the ambient conditions that define the engine power to be used during the compliance demonstration is consistent with existing advisory material and current industry practice.

#### **Section 27.143 Controllability and maneuverability**

The proposal would revise § 27.143(a)(2)(v) to replace the word “glide” with “autorotation”. This minor change does not affect the method of compliance but states the required flight condition in more traditional rotorcraft terminology.

This proposal would redesignate § 27.143(c) paragraphs (1) through (4). Paragraph (4) would become paragraph (1) and paragraphs (1), (2), and (3) would become paragraphs (i), (ii), and (iii). Paragraph § 27.143(c) is rewritten in a manner to more clearly state that controllability on or near the ground must be demonstrated throughout a range of speeds from zero to at least 17 knots. The rule as previously written could lead some applicants to conclude that only a 17-knot controllability data point must be considered when, in fact, the most critical speed may be less than 17 knots. That was not the intent of that requirement. Additionally, the altitude requirement is clarified with the addition of the words "density altitude".

Section 27.143(c)(2) would be added to require that controllability be determined at altitudes above 7,000 feet density altitude if takeoff and landing data are scheduled above that altitude. Currently, no requirement exists to determine controllability above 7,000 feet, even though takeoff and landing data may be presented above that altitude. With the advent of lighter and more powerful engines, it is not uncommon for rotorcraft

to operate at altitudes that, until recently, were limited to a small number of rotorcraft performing very specialized operations. Since more rotorcraft are operating at these altitudes, safety dictates that controllability and maneuverability be determined above 7,000 feet.

The proposal would also add § 27.143(d) to determine controllability for wind velocities from zero to at least 17-knots OGE at weights selected by the applicant. Operations in support of law enforcement, search and rescue, and media coverage are often performed in such a manner that the rotorcraft performance in rearward or quartering flight is important in accomplishing the mission flown. This new requirement, in conjunction with the proposed zero wind OGE hover requirement of § 27.49, would increase the level of safety by requiring additional performance information.

#### **Section 29.143 Controllability and maneuverability**

The proposal would revise § 29.143(a)(2)(v) to replace the word “glide” with “autorotation”. This minor change does not affect the method of compliance but states the required flight condition in more traditional rotorcraft terminology.

Paragraph § 29.143(c) was rewritten in a manner to clarify that controllability on or near the ground must be demonstrated throughout a range of speeds from zero to at least 17 knots. The rule as previously written could lead to some applicants to the conclusion that only a 17-knot controllability data point must be considered when, in fact, the most critical speed may be less than 17 knots. The proposal would add § 29.143(c)(4) to explicitly require that controllability be determined for wind velocities up to at least 17 knots at an altitude from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft. The new rule reflects current practice.



The proposal would add a new § 29.143(d) to require that controllability be determined for wind velocities up to at least 17 knots OGE at weights selected by the applicant. Today, operations in support of law enforcement, search and rescue, and media coverage will often be performed in such a manner that the rotorcraft performance in rearward or quartering flight are of concern to the pilot.

#### **Sections 27.173 and 29.173 Static longitudinal stability**

A minor clarification change is made to paragraph (a) to change "a speed" to "an airspeed". Additionally, these proposals would combine paragraph (c) with paragraph (b). The proposals would reword the paragraph to allow neutral or negative static stability in limited areas of the flight envelope if adequate compensating characteristics are present and the pilot can maintain airspeed within 5 knots of the desired trim speed during the conditions specified in §§ 27.175 and 29.175. The ability to maintain appropriate airspeed control during other flight conditions would be tested under §§ 27.143 and 29.143. Neutral or negative static longitudinal stability in limited flight domains has been allowed for numerous rotorcraft under equivalent level of safety findings. The satisfactory experience gained with these equivalent safety findings has provided the basis for the proposed change. Historically, these limited flight domains have been encountered at the aft limit of the weight/CG envelopes during descent, or autorotation, or climb stability demonstrations. Historically, negative longitudinal control position gradient versus airspeed has generally been no more than 2 to 3 percent of the total control travel. Additionally, these proposals would delete the §§ 27.173(c) and 29.173(c) requirements relating to the hover demonstration specified in the current §§ 27.175(d) and 29.175(d). See additional discussion at §§ 27.175 and 29.175.

## **Sections 27.175 and 29.175 Demonstration of static longitudinal stability**

The proposals in paragraphs (a) and (b) would decrease the speed range about the specified trim speeds to more representative values than are currently contained in the rule. A new paragraph (c) would require an additional level flight demonstration point. The present paragraph (c) would be redesignated as paragraph (d). The present paragraph (d) containing the hover demonstration point would be deleted.

The present requirement is not appropriate for the newer generation of rotorcraft. When the current rule was written, the cruise demonstration of  $0.7 V_H$  to  $1.1 V_H$  typically represented approximately a 30-knot speed variation for helicopters. Now, the cruise demonstration, between the maximum and the minimum speeds ( $1.1 V_H$  and  $0.7 V_H$ ), can encompass such a large speed range that the trim point and end points actually represent completely different flight regimes rather than perturbations about a trim point in a given flight regime. For some modern helicopters with a never-exceed speed ( $V_{NE}$ ) in excess of 150 knots, the speed variation for the cruise demonstration could approach 60 knots, which makes the maneuver difficult to perform and does not represent a normal variation about a trim point. These proposals would reduce the speed range for the cruise demonstration to  $\pm 10$  knots about the specified trim point.

An additional demonstration point at a trim airspeed of  $V_{NE} - 10$  knots is proposed to maintain the data coverage over a speed range similar to that contained in the current regulation.

For the demonstration in autorotation, the current rule does not precisely define the trim speed. The proposal would add two typically used trim speeds--minimum rate of descent and best angle of glide airspeeds--for the stability demonstration. These

airspeeds are currently defined and used in other sections of the regulation (§§ 27.67 and 27.71). The proposal would also limit the speed range for demonstration to  $\pm 10$  knots from the trim points. The proposed new trim points and speed ranges may not encompass  $V_{NE}$  in autorotation as explicitly required in the present regulation. However, the proposed points provide data at the most likely operating conditions. Autorotation at  $V_{NE}$  is typically a transient and dynamic flight condition that often places high workload demands on the pilot due primarily to maintaining rotor speed control and the desired flight path. During these dynamic conditions of autorotation at  $V_{NE}$  that are evaluated under §§ 27.143 and 29.143, longitudinal static stability is less important than in the more stabilized conditions as proposed.

These proposals would delete the hover demonstration requirements of §§ 27.175(d) and 29.175(d). The controllability and maneuverability requirements contained in §§ 27.143(c) and 29.143(c), adequately address the safety concerns during hover flight. In conjunction with this proposal, §§ 27.173(c) and 29.173(c) would also be removed.

#### **Sections 27.177 and 29.177 Static directional stability**

These proposals would revise §§ 27.177 and 29.177 to change the demonstration criteria. The present rule contains general language and relies on a pilot's subjective judgement that he is approaching the slideslip limit, which could cause some difficulties in making compliance determinations due to a lack of objective test criteria. The proposals would provide a definition of the slideslip envelope over which the directional stability characteristics of rotorcraft are evaluated. The proposed rule also allows for a minimal amount of negative stability around each trim point. This recognizes the

characteristics exhibited by many rotorcraft that have some airflow blockage of the vertical fin or tail rotor at small sideslip angles. These characteristics do not materially affect the safety considerations of static directional stability.

### **Section 27.903 Engines**

This proposal would revise § 27.903 to add a new paragraph (d) to require engine restart capability. A restart capability is a fundamental necessity for any aircraft to minimize the risk of a forced landing. A study of accident and incident data shows a large number of engine failures or flameouts. A number of these resulted in successful in-flight restarts (on rotorcraft with the capability) following failure due to causes such as snow and ice ingestion, fuel contamination, or fuel mismanagement. Even though a restart capability will not be useful in every case, such as when there is engine damage or insufficient altitude to carry out the restart procedure, a restart capability will enhance safety. The proposed text, taken directly from § 29.903(e), would require an in-flight restart capability for both single-engine and multiengine rotorcraft.

### **Section 27.1587 Performance information**

Section 27.1587(a) would be revised to include a reference to new § 27.49. Section 27.1587(a)(2)(i) and (ii) would be revised to specifically include requirements for presenting maximum safe winds for OGE operations as proposed in § 27.143. Section 27.1587(b)(1)(i) and (ii) would be deleted. These two paragraphs were moved into § 27.1585(a) by Amendment 27-21 and were inadvertently not removed from § 27.1587.

### **Section 29.1587 Performance information**

The proposal to revise § 29.1587 would require new performance information that would be included in the RFM. Sections 29.1587(a)(7) and 29.1587(b)(8) would be

amended to include the requirements for presenting maximum safe winds for OGE operations as presented in the proposed changes to § 29.143.

#### **Appendix B to Part 27 - Airworthiness Criteria for Helicopter Instrument Flight**

The proposal amends paragraph (V)(a) to allow for a minimal amount of neutral or negative stability around trim and removes the words "approximate constant proportion", which is a subjective standard and is subject to differing interpretation. This is consistent with the change that is proposed in § 27.177 of the VFR requirements. Additionally, the proposed paragraph requires that the pilot be able to maintain the desired heading without exceptional skill or alertness.

The proposal revises paragraph VII(a)(1) and VII(a)(2). The original intent of the rule remains fundamentally unchanged. The change elaborates on the standards that must be met when considering a stability augmentation system failure.

#### **Appendix B to Part 29 - Airworthiness Criteria for Helicopter Instrument Flight**

The proposal amends paragraph (V)(a) to allow for a minimal amount of neutral or negative stability around trim and removes the words "approximate constant proportion", which is a subjective standard and is subject to differing interpretation. This is consistent with the change that is proposed in the VFR requirements. Additionally, the proposed paragraph requires that the pilot must be able to maintain the desired heading without exceptional skill or alertness. In paragraph (V)(b), the word "cycle" is replaced by the correct word, "cyclic".

The proposal revises paragraph VII(a)(1) and VII(a)(2). The original intent of the rule remains fundamentally unchanged. The change elaborates on the standards that must be met when considering a stability augmentation system failure.

**Paperwork Reduction Act**

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. We have determined that there are no new information collection requirements associated with this proposed rule.

**International Compatibility**

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these proposed regulations.

**Economic Evaluation, Regulatory Flexibility Determination, International Trade Impact Assessment, and Unfunded Mandates Assessment**

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency propose or adopt a regulation only upon a determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (19 U.S.C. section 2531-2533) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act also requires agencies to consider international standards and, where appropriate, use them as the basis of U.S. standards. And fourth, the Unfunded Mandates Reform Act of 1995 requires agencies to prepare a written assessment of the

costs, benefits and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local or tribal governments, in the aggregate, or by the private sector, of \$100 million or more annually (adjusted for inflation.)

In conducting these analyses, the FAA has determined this rule 1) has benefits which do justify its costs, is not a “significant regulatory action” as defined in the Executive Order and is not “significant” as defined in DOT's Regulatory Policies and Procedures; 2) will not have a significant impact on a substantial number of small entities; 3) reduces barriers to international trade; and 4) does not impose an unfunded mandate on state, local, or tribal governments, or on the private sector. These analyses, available in the docket, are summarized below.

The purpose of this proposal is to codify existing policy and practice and to revise the flight requirements to incorporate flight test procedures for performance and handling qualities that reflect the evolution of rotorcraft capabilities. The proposal consists of rules that would update the rotorcraft performance and handling qualities' standards. These rules revise several sections of FAR parts 27 and 29 pertaining to flight performance and handling qualities. The FAA estimates that the total cost expected to accrue from implementation of the proposed rule to be \$305,000 in 2000 dollars or \$203,000 over the next 10 years when costs are discounted at 7 percent. The industry is expected to incur almost all of the above costs. Costs to the FAA are expected to be small and cannot be quantified with any degree of accuracy.

### **Regulatory Flexibility Act**

The Regulatory Flexibility Act (RFA) of 1980, (5 U.S.C. 601 et seq.) directs the

FAA to fit regulatory requirements to the scale of the business, organizations, and governmental jurisdictions subject to the regulation. We are required to determine whether a proposed or final action will have a significant impact on a substantial number of "small entities" as defined by the Act. If we find that the action will have a significant impact, we must do a "regulatory flexibility analysis."

### **Trade Impact Assessment**

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be the basis for U.S. standards. The FAA has assessed the potential effect of this proposed rule and has determined that it would have only a domestic impact and therefore no affect on any trade-sensitive activity.

### **Unfunded Mandates Reform Act**

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of \$100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed "significant intergovernmental mandate." A "significant intergovernmental mandate"



under the Act is any provision in a Federal agency regulation that would impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of \$100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

This proposed rule does not meet the cost thresholds described above. Furthermore, this proposed rule would not impose a significant cost on small governments and would not uniquely affect those small governments. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

#### **Executive Order 13132, Federalism**

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action would not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, we determined that this notice of proposed rulemaking would not have federalism implications.

#### **Environmental Analysis**

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental impact

statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), this proposed rulemaking action qualifies for a categorical exclusion.

### **Energy Impact**

The energy impact of the notice has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) Pub. L. 94-163, as amended (42 U.S.C. 6362) and FAA Order 1053.1. It has been determined that the notice is not a major regulatory action under the provisions of the EPCA.

### **List of Subjects**

#### **14 CFR Parts 27 and 29**

Air transportation, Aircraft, Aviation safety, Rotorcraft, Safety

### **The Proposed Amendment**

In consideration of the foregoing, the Federal Aviation Administration proposes to amend parts 27 and 29 of Title 14, Code of Federal Regulations, as follows:

#### **PART 27 - AIRWORTHINESS STANDARDS: NORMAL CATEGORY ROTORCRAFT**

1. The authority citation for part 27 continues to read as follows:

**Authority:** 49 U.S.C. 106(g) 40113, 44701- 44702, 44704.

2. Revise § 27.25 as follows:

#### **§ 27.25 Weight limits.**

(a) \* \* \*

(1) Not more than--

(i) The highest weight selected by the applicant;

(ii) The design maximum weight (the highest weight at which compliance with each applicable structural loading condition of this part is shown);

(iii) The highest weight at which compliance with each applicable flight requirement of this part is shown; or

(iv) The highest weight in which the provisions of § 27.79 or § 27.143(c)(1), or combinations thereof, are demonstrated if the weights and operating conditions (altitude and temperature) prescribed by those requirements cannot be met; and

\* \* \* \* \*

2. Redesignate § 27.73 as new § 27.49 and revise to read as follows:

**§ 27.49 Performance at minimum operating speed.**

(a) For helicopters--

(1) The hovering ceiling must be determined over the ranges of weight, altitude, and temperature for which certification is requested, with--

(i) Takeoff power;

(ii) The landing gear extended; and

(iii) The helicopter in ground effect at a height consistent with normal takeoff procedures; and

(2) The hovering ceiling determined under paragraph (a)(1) of this section must be at least--

(i) For reciprocating engine powered helicopters, 4,000 feet at maximum weight with a standard atmosphere; or

(ii) For turbine engine powered helicopters, 2,500 feet pressure altitude at maximum weight at a temperature of standard plus 22°C (standard plus 40°F).

(3) The out-of-ground-effect hovering performance must be determined over the ranges of weight, altitude, and temperature for which certification is requested, using takeoff power.

(b) For rotorcraft other than helicopters, the steady rate of climb at the minimum operating speed must be determined over the ranges of weight, altitude, and temperature for which certification is requested, with--

(1) Takeoff power; and

(2) The landing gear extended.

3. Revise § 27.51 to read as follows:

**§ 27.51 Takeoff.**

The takeoff, with takeoff power and r.p.m. at the most critical center of gravity, and with weight from the maximum weight at sea level to the weight for which takeoff certification is requested for each altitude covered by this section--

(1) May not require exceptional piloting skill or exceptionally favorable conditions throughout the ranges of altitude from standard sea level conditions to the maximum altitude for which takeoff and landing certification is requested, and

(2) Must be made in such a manner that a landing can be made safely at any point along the flight path if an engine fails. This must be demonstrated up to the maximum altitude for which takeoff and landing certification is requested or 7,000 feet density altitude, whichever is less.

4. Revise § 27.75(a) to read as follows:

**§ 27.75 Landing.**

(a) The rotorcraft must be able to be landed with no excessive vertical acceleration, no tendency to bounce, nose over, ground loop, porpoise, or water loop, and without exceptional piloting skill or exceptionally favorable conditions, with approach or autorotation speeds appropriate to the type of rotorcraft and selected by the applicant; and the approach and landing made with --

(1) Power off, for single engine rotorcraft and entered from steady state autorotation; or

(2) One-engine inoperative (OEI) and with each operating engine within approved operating limitations, for multiengine rotorcraft and entered from an established OEI approach.

\* \* \* \* \*

5. Revise §§ 27.79(a)(1) and (b)(2) to read as follows:

**§ 27.79 Limiting height-speed envelope.**

(a) \* \* \*

(1) Altitude, from standard sea level conditions to the maximum altitude capability of the rotorcraft, or 7,000 feet density altitude, whichever is less; and

(2) Weight, from the maximum weight at sea level to the weight selected by the applicant for each altitude covered by paragraph (a)(1) of this section. For helicopters, the weight at altitudes above sea level may not be less than the maximum weight or the highest weight allowing hovering out-of-ground effect, whichever is lower.

(b) \* \* \*

(1) \* \* \*

(2) For multiengine helicopters, OEI (where engine isolation features insure continued operation of the remaining engines), and the remaining engine(s) within approved limits and at the minimum installed specification power available for the most critical combination of approved ambient temperature and pressure altitude resulting in 7000-foot density altitude or the maximum altitude capability of the helicopter, whichever is less, and--

(3) \* \* \*

6. Amend § 27.143, by revising paragraph (a)(2)(v) by removing the word “Glide” and adding the word “Autorotation” in its place; redesignating paragraphs (d) and (e) as paragraphs (e) and (f) respectively; revising paragraph (c); and adding a new paragraph (d) to read as follows:

**§ 27.143 Controllability and maneuverability.**

\* \* \* \* \*

(c) Wind velocities from zero to at least 17 knots, from all azimuths, must be established in which the rotorcraft can be operated without loss of control on or near the ground in any maneuver appropriate to the type (such as crosswind takeoffs, sideward flight, and rearward flight)--

(1) With altitude, from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft or 7000 feet density altitude, whichever is less; with:

- (i) Critical Weight;
- (ii) Critical center of gravity;
- (iii) Critical rotor rpm;

(2) For takeoff and landing altitudes above 7000 feet density altitude with--

- (i) Weight selected by the applicant;
- (ii) Critical center of gravity; and
- (iii) Critical rotor rpm.

(d) Wind velocities from zero to at least 17 knots, from all azimuths, must be established in which the rotorcraft can be operated without loss of control out-of-ground-effect, with--

- (1) Weight selected by the applicant;
- (2) Critical center of gravity;
- (3) Rotor rpm selected by the applicant; and
- (4) Altitude, from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft.

\* \* \* \* \*

7. Amend § 27.173 by removing the words "a speed" in the two places in paragraph (a) and adding the words "an airspeed" in both their places; deleting paragraph (c); and revising paragraph (b) to read as follows:

**§ 27.173 Static longitudinal stability.**

\* \* \* \* \*

(b) Throughout the full range of altitude for which certification is requested, with the throttle and collective pitch held constant during the maneuvers specified in § 27.175(a) through (d), the slope of the control position versus airspeed curve must be positive. However, in limited flight conditions or modes of operation determined by the Administrator to be acceptable, the slope of the control position versus airspeed curve

may be neutral or negative if the rotorcraft possesses flight characteristics that allow the pilot to maintain airspeed within  $\pm 5$  knots of the desired trim airspeed without exceptional piloting skill or alertness.

8. Amend § 27.175 by deleting paragraph (d); revising the introductory text in paragraphs (a) and (b); revising paragraphs (b)(3) and (b)(5); redesignating paragraphs (c) as (d) and revising redesignated paragraph (d); and adding a new paragraph (c) to read as follows:

**§ 27.175 Demonstration of static longitudinal stability.**

(a) *Climb*. Static longitudinal stability must be shown in the climb condition at speeds from  $V_y - 10$  kt, to  $V_y + 10$  kt with--

\* \* \* \* \*

(b) *Cruise*. Static longitudinal stability must be shown in the cruise condition at speeds from  $0.8 V_{NE} - 10$  kt to  $0.8 V_{NE} + 10$  kt or, if  $V_H$  is less than  $0.8 V_{NE}$ , from  $V_H - 10$  kt to  $V_H + 10$  kt, with--

(1) \* \* \*

(2) \* \* \*

(3) Power for level flight at  $0.8 V_{NE}$  or  $V_H$ , whichever is less;

(4) \* \* \*

(5) The rotorcraft trimmed at  $0.8 V_{NE}$  or  $V_H$ , whichever is less;

(c)  $V_{NE}$ . Static longitudinal stability must be shown at speeds from  $V_{NE} - 20$  kt to  $V_{NE}$  with--

(1) Critical weight;

(2) Critical center of gravity;



(3) Power required for level flight at  $V_{NE} - 10$  kt or maximum continuous power, whichever is less;

(4) The landing gear retracted; and

(5) The helicopter trimmed at  $V_{NE} - 10$  kt.

(d) *Autorotation*. Static longitudinal stability must be shown in autorotation at--

(1) Airspeeds from the minimum rate of descent airspeed - 10 kt to the minimum rate of descent airspeed + 10 kt, with--

(i) Critical weight;

(ii) Critical center of gravity;

(iii) The landing gear extended;

(iv) The rotorcraft trimmed at the minimum rate of descent speed.

(2) Airspeeds from best angle-of-glide airspeed - 10kt to the best angle-of-glide airspeed + 10kt, with--

(i) Critical weight;

(ii) Critical center of gravity;

(iii) The landing gear retracted;

(iv) The rotorcraft trimmed at the best angle-of-glide speed.

9. Revise § 27.177 to read as follows:

**§ 27.177 Static directional stability.**

(a) The directional controls must operate in such a manner that the sense and direction of motion of the rotorcraft following control displacement are in the direction of the pedal motion with the throttle and collective controls held constant at the trim

conditions specified in § 27.175 (a), (b), and (c). Sideslip angles must increase with steadily increasing directional control deflection for sideslip angles up to the lesser of--

(1)  $\pm 25$  degrees from trim at a speed of 15 knots less than the speed for minimum rate of descent varying linearly to  $\pm 10$  degrees from trim at  $V_{NE}$ ;

(2) The limit sideslip angle defined under § 27.351;

(3) A sideslip angle selected by the applicant which corresponds to a sideforce of at least 0.1g; or,

(4) The sideslip angle attained by maximum directional control input.

(b) Sufficient cues must accompany sideslip to alert the pilot when approaching sideslip limits.

(c) During the maneuver specified in (a), the sideslip angle versus directional control position curve may have a negative slope within a small range of angles around trim, provided the desired heading can be maintained without exceptional piloting skill or alertness.

10. Add a new § 27.903(d).

**§ 27.903 Engines.**

\* \* \* \* \*

(d) Restart capability:

(1) A means to restart any engine in flight must be provided.

(2) Except for the in-flight shutdown of all engines, engine restart capability must be demonstrated throughout a flight envelope for the rotorcraft.

(3) Following the in-flight shutdown of all engines, in-flight engine restart capability must be provided.

11. Amend § 27.1587 by removing the reference “27.51” in paragraph (a) and adding "27.49" in its place; deleting paragraphs (b)(1)(i) and (b)(1)(ii); and revising (a)(2)(i) and (a)(2)(ii) to read as follows:

**§ 27.1587 Performance information.**

(a) The Rotorcraft Flight Manual must contain the following information, determined in accordance with §§ 27.49 through 27.79 and 27.143(c) and (d):

(1) \* \* \*

(2) \* \* \*

(i) The steady rates of climb and decent, in-ground-effect and out-of-ground effect hovering ceilings, together with the corresponding airspeeds and other pertinent information including the calculated effects of altitude and temperatures;

(ii) The maximum weight for each altitude and temperature condition at which the rotorcraft can safely hover in-ground effect and out-of-ground effect in winds of not less than 17 knots from all azimuths. These data shall be clearly referenced to the appropriate hover charts. In addition, if there are other combinations of weight, altitude and temperature for which performance information is provided and at which the rotorcraft cannot land and takeoff safely with the maximum wind value, those portions of the operating envelope and the appropriate safe wind conditions shall be stated in the Rotorcraft Flight Manual;

\* \* \* \* \*

12. Amend Appendix B to Part 27 - Airworthiness Criteria for Helicopter Instrument Flight by revising paragraph V(a) and VII(a) to read as follows:

**Appendix B to Part 27--Airworthiness Criteria for Helicopter Instrument Flight**

\* \* \* \* \*

## V. Static lateral-directional stability.

(a) Static directional stability must be positive throughout the approved ranges of airspeed, power, and vertical speed. Except for a small range of sideslip angles around trim, in straight and steady sideslips up to  $\pm 10^\circ$  from trim, directional control position must increase without discontinuity with angle of sideslip. At greater angles up to the maximum sideslip angle appropriate to the type, increased directional control position must produce increased angle of sideslip. It must be possible to maintain balanced flight without exceptional pilot skill or alertness.

(b) \* \* \*

\* \* \* \* \*

## VII. Stability Augmentation System (SAS).

(a) If a SAS is used, the reliability of the SAS must be related to the effects of its failure. The occurrence of any failure condition which would prevent continued safe flight and landing must be extremely improbable. It must be shown that, for any failure condition of the SAS which is not shown to be extremely improbable--

(1) The helicopter is safely controllable when the failure or malfunction occurs at any speed or altitude within the approved IFR operating limitations; and

(2) The overall flight characteristics of the helicopter allow for prolonged instrument flight without undue pilot effort. Additional unrelated probable failures affecting the control system must be considered. In addition--

(i) The controllability and maneuverability requirements in Subpart B of this part must be met throughout a practical flight envelope;

(ii) The flight control, trim, and dynamic stability characteristics must not be impaired below a level needed to allow continued safe flight and landing; and

(iii) The static longitudinal and static directional stability requirements of Subpart B of this part must be met throughout a practical flight envelope.

\* \* \* \* \*

## **PART 29 - AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY ROTORCRAFT**

13. The authority citation for part 29 continues to read as follows:

**Authority:** 49 U.S.C. 106(g) 40113, 44701- 44702, 44704.

14. Amend § 29.25 by adding paragraph (a)(4)

### **§ 29.25 Weight limits.**

(a) \* \* \*

(4) For Category B rotorcraft with 9 or less passenger seats, the maximum weight, altitude, and temperature at which the rotorcraft can safely operate near the ground with the maximum wind velocity determined under § 29.143(c) and may include other demonstrated wind velocities and azimuths. The operating envelopes shall be stated in the Limitations section of the Rotorcraft Flight Manual.

\* \* \* \* \*

15. Amend § 29.143 by revising paragraph (a)(2)(v) by removing the word "Glide" and adding the word "Autorotation" in its place; redesignating paragraphs (d) and (e) as paragraphs (e) and (f) respectively; revising paragraph (c); and adding a new paragraph (d) to read as follows:

### **§ 29.143 Controllability and maneuverability.**

\* \* \* \* \*

(c) Wind velocities from zero to at least 17 knots, from all azimuths, must be established in which the rotorcraft can be operated without loss of control on or near the ground in any manner appropriate to the type (such as crosswind takeoffs, sideward flight, and rearward flight), with--

(1) Critical weight;

(2) Critical center of gravity;

(3) Critical rotor r.p.m.; and

(4) Altitude, from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft.

(d) Wind velocities from zero to at least 17 knots, from all azimuths, must be established in which the rotorcraft can be operated without loss of control out-of-ground-effect, with--

(1) Weight selected by the applicant;

(2) Critical center of gravity;

(3) Rotor rpm selected by the applicant; and

(4) Altitude, from standard sea level conditions to the maximum takeoff and landing altitude capability of the rotorcraft.

\* \* \* \* \*

16. Amend § 29.173 by removing the words “a speed” in the two places in paragraph (a) and adding the words “an airspeed” in their places; deleting paragraph (c); and revising paragraph (b) to read as follows:

**§ 29.173 Static longitudinal stability.**

\* \* \* \* \*

(b) Throughout the full range of altitude for which certification is requested, with the throttle and collective pitch held constant during the maneuvers specified in § 29.175(a) through (d), the slope of the control position versus airspeed curve must be positive. However, in limited flight conditions or modes of operation determined by the Administrator to be acceptable, the slope of the control position versus airspeed curve may be neutral or negative if the rotorcraft possesses flight characteristics that allow the pilot to maintain airspeed within  $\pm 5$  knots of the desired trim airspeed without exceptional piloting skill or alertness.

17. Amend § 29.175 by deleting paragraph (d); revising the introductory text in paragraphs (a) and (b); revising paragraphs (b)(3) and (b)(5); redesignating paragraph (c) as paragraph (d) and revising the redesignated paragraph (d); and adding a new paragraph (c) to read as follows:

**§ 29.175 Demonstration of static longitudinal stability.**

(a) *Climb*. Static longitudinal stability must be shown in the climb condition at speeds from  $V_y - 10$  kt, to  $V_y + 10$  kt with--

\* \* \* \* \*

(b) *Cruise*. Static longitudinal stability must be shown in the cruise condition at speeds from  $0.8 V_{NE} - 10$  kt to  $0.8 V_{NE} + 10$  kt or, if  $V_H$  is less than  $0.8 V_{NE}$ , from  $V_H - 10$  kt to  $V_H + 10$  kt, with--

(1) \* \* \*

(2) \* \* \*

(3) Power for level flight at  $0.8 V_{NE}$  or  $V_H$ , whichever is less;

(4) \* \* \*

(5) The rotorcraft trimmed at  $0.8 V_{NE}$  or  $V_H$ , whichever is less;

(c)  $V_{NE}$ . Static longitudinal stability must be shown at speeds from  $V_{NE} - 20$  kt to

$V_{NE}$  with--

(1) Critical weight;

(2) Critical center of gravity;

(3) Power required for level flight at  $V_{NE} - 10$  kt or maximum continuous power,

whichever is less;

(4) The landing gear retracted; and

(5) The helicopter trimmed at  $V_{NE} - 10$  kt.

(d) *Autorotation*. Static longitudinal stability must be shown in autorotation at--

(1) Airspeeds from the minimum rate of descent airspeed - 10 kt to the minimum

rate of descent airspeed + 10 kt, with--

(i) Critical weight;

(ii) Critical center of gravity;

(iii) The landing gear extended;

(iv) The rotorcraft trimmed at the minimum rate of descent speed.

(2) Airspeeds from the best angle-of-glide airspeed - 10kt to the best angle-of-

glide airspeed + 10kt, with--

(i) Critical weight;

(ii) Critical center of gravity;

(iii) The landing gear retracted;

(iv) The rotorcraft trimmed at the best angle-of-glide speed.



18. Revise § 29.177 to read as follows:

**§ 29.177 Static directional stability.**

(a) The directional controls must operate in such a manner that the sense and direction of motion of the rotorcraft following control displacement are in the direction of the pedal motion with throttle and collective controls held constant at the trim conditions specified in § 29.175 (a), (b), (c), and (d). Sideslip angles must increase with steadily increasing directional control deflection for sideslip angles up to the lesser of--

(1)  $\pm 25$  degrees from trim at a speed of 15 knots less than the speed for minimum rate of descent varying linearly to  $\pm 10$  degrees from trim at  $V_{NE}$ ;

(2) The limit sideslip angle defined under § 29.351;

(3) A sideslip angle selected by the applicant which corresponds to a sideforce of at least 0.1g; or,

(4) The sideslip angle attained by maximum directional control input.

(b) Sufficient cues must accompany sideslip to alert the pilot when approaching sideslip limits.

(c) During the maneuver specified in (a), the sideslip angle versus directional control position curve may have a negative slope within a small range of angles around trim, provided the desired heading can be maintained without exceptional piloting skill or alertness.

19. Amend § 29.1587 by revising paragraph (a)(7) and (b)(8) to read as follows:

**§ 29.1587 Performance information.**

\* \* \* \* \*

(a) \* \* \*

(7) Out-of-ground effect hover performance determined under § 29.49 and the maximum weight for each altitude and temperature condition at which the rotorcraft can safely hover in-ground-effect and out-of-ground-effect in winds of not less than 17 knots from all azimuths. This data shall be clearly referenced to the appropriate hover charts.

(b) \* \* \*

(8) Out-of-ground effect hover performance determined under § 29.49 and the maximum safe wind demonstrated under the ambient conditions for data presented. In addition, the maximum weight for each altitude and temperature condition at which the rotorcraft can safely hover in-ground-effect and out-of-ground-effect in winds of not less than 17 knots from all azimuths. This data shall be clearly referenced to the appropriate hover charts; and

\* \* \* \* \*

20. Amend Appendix B to Part 29 - Airworthiness Criteria for Helicopter Instrument Flight by revising paragraph (V)(b) by removing the word "cycle" and adding the correct word "cyclic" in its place; and revising paragraph V(a) and VII(a) to read as follows: **Appendix B to Part 29--Airworthiness Criteria for Helicopter Instrument Flight**

\* \* \* \* \*

V. Static lateral-directional stability.

(a) Static directional stability must be positive throughout the approved ranges of airspeed, power, and vertical speed. Except for a small range of sideslip angles around trim, in straight and steady sideslips up to  $\pm 10^\circ$  from trim, directional control position must increase without discontinuity with angle of sideslip. At greater angles up to the

maximum sideslip angle appropriate to the type, increased directional control position must produce increased angle of sideslip. It must be possible to maintain balanced flight without exceptional pilot skill or alertness.

\* \* \* \* \*

## VII. Stability Augmentation System (SAS).

(a) If a SAS is used, the reliability of the SAS must be related to the effects of its failure. The occurrence of any failure condition which would prevent continued safe flight and landing must be extremely improbable. It must be shown that for any failure condition of the SAS which is not shown to be extremely improbable--

(1) The helicopter is safely controllable when the failure or malfunction occurs at any speed or altitude within the approved IFR operating limitations; and

(2) The overall flight characteristics of the helicopter allow for prolonged instrument flight without undue pilot effort. Additional unrelated probable failures affecting the control system must be considered. In addition--

(i) The controllability and maneuverability requirements in Subpart B of this part must be met throughout a practical flight envelope;

(ii) The flight control, trim, and dynamic stability characteristics must not be impaired below a level needed to allow continued safe flight and landing;

(iii) For Category A helicopters, the dynamic stability requirements of Subpart B of this part must also be met throughout a practical flight envelope; and

(iv) The static longitudinal and static directional stability requirements of Subpart B of this part must be met throughout a practical flight envelope.

\* \* \* \* \*

Issued in Washington, DC, on

[Name of Office Director]

[Title of Office Director]

## FAA Action

April 27, 2004

Mr. John D. Swihart, Jr.  
Helicopter Association International  
7313 Janetta Drive  
Fort Worth, TX 76180

Dear Mr. Swihart:

This letter acknowledges receipt of a recommendation from the Aviation Rulemaking Advisory Committee (ARAC) on Rotorcraft Issues.

In February 2002, you submitted a recommendation for rulemaking on Performance Handling Qualities. The recommendation was in response to a task supported by the Performance and Handling Qualities Requirements Working Group.

I wish to thank the ARAC and the working group for the resources they spent in developing the recommendation. We consider your submittal of the recommendation as completion of the task. Therefore, we have "closed" the task, placed the recommendation on the ARAC website at <http://www.faa.gov/avr/arm/arac/index.cfm>, and have forwarded it to the Rotorcraft Directorate for review and decision. We will continue to keep you apprised of our efforts on the ARAC recommendation at the regular ARAC meetings.

Sincerely,

/S/

Anthony F. Fazio  
Executive Director, Aviation Rulemaking  
Advisory Committee